CPP

SETS & RELATIONS : SHEET - 1

Problems involving Definition of sets, types of sets & subsets of a given set

Level-1

Q.1 Which of the following statements is true for sets -
(A) a collection of well defined objects
(B) a collection of objects
(C) a collection of well defined objects which are distinct and distinguishable
(D) All of the above

Q.2 The collection of intelligent students in a class is
(A) A null set (B) A singleton set
(C) A finite set (D) Not a set

Q.3 The set {x : x $\in$ N, x is prime and 3 < x < 5} is-
(A) { 4 } (B) { 3, 5 } (C) Void (D) Non – Void

Q.4 A = {a, e, i, o, u}and B = {i, o} then the true statement is -
(A) A $\subset$ B (B) B $\subset$ A (C)A = B (D) A is equivalent B

Q.5 A set is defined as A = {x : x is irrational and 0.1 < x < 0. 101} then :
(A) A is null set (B) A is finite set (C) A is infinite set (D) none

Q.6 Which of the following is a singleton Set -
(A) ϕ (B) { } (C) {2, 3} (D) {ϕ}

Q.7 If A = {ϕ, {ϕ}}, then the power set of A is -
(A) A (B) {ϕ, {ϕ}, A} (C) {ϕ, {ϕ},{{ϕ}}, A} (D) none

Q.8 Which of the following is the empty set
(A) $\{x : x$ is a real number and $x^2 - 1 = 0\}$ (B) {x : x is a real number and $x^2 + 1 = 0\}$
(C) {x : x is a real number and $x^2 - 9 = 0\}$ (D) {x : x is a real number and $x^2 = x + 2\}$

Q.9 Which of the following is the empty set ?
(A) {x : x $\in$ R and $x^2 + x + 1 = 0$} (B) {x : x $\in$ R and $x^2 - x - 6 = 0$}
(C) {x : x $\in$ R and $x^2 + 2x + 1 \le 0$} (D) {x : x $\in$ R and $x^2 - 2x + 1 \ge 0$}

Q.10 Two finite sets have m and n elements respectively. The total number of subsets of first set is 56 more than the total number of subsets of the second set. The values of m and n respectively are -
(A) 7, 6 (B) 6, 3 (C) 5, 1 (D) 8, 7

LEVEL-2

Q.1 Which of the following is not a null set?
(a) {} (b) ϕ (c) $\{x : x = x\}$ (d) $\{x : x \neq x\}$

Q.2 $A = \{x : x \neq x\}$ represents
(a) {0} (b) {} (c) {1} (d) {x}

Q.3 If $Q = \left\{x : x = \frac{1}{y}, \text{where } y \in N\right\}$, then
(a) $0 \in Q$ (b) $1 \in Q$ (c) $2 \in Q$ (d) $\frac{2}{3} \in Q$

Q.4 The number of elements in the set $\{(a,b): 2a^2 + 3b^2 = 35, a,b \in Z\}$, where Z is the set of all integers, is

(a) 2 (b) 4 (c) 8 (d) 12

Q.5 Which of the following is a true statement

(a) $\{a\} \in \{a, b, c\}$ (b) $\{a\} \subseteq \{a, b, c\}$ (c) $\phi \in \{a, b, c\}$ (d) None of these

Q.6 Which of the following is the empty set ?

(A) $\{x : x \in R \text{ and } x^2 + x + 1 = 0\}$

(B) $\{x : x \in R \text{ and } x^2 - x - 2 = 0\}$

(C) $\{x : x \in R \text{ and } x^2 + 2x + 1 \leq 0\}$

(D) $\{x : x \in R \text{ and } x^2 - 2x + 1 \geq 0\}$

Q.7. Write $A = \{x : x^4 - 5x^2 + 6 = 0, x \in R\}$ in the roaster form.

Q.8. If $X = \{x: x \text{ is a positive factor of the number } 2^{p-1}(2^p-1), \text{ where } 2^p-1 \text{ is a prime number}\}$. Write X in the roaster form .

Q.9. State which of the following statements are true and which are false. Justify your answer.

(i) $35 \in \{x: x \text{ has exactly four positive factors}\}$.

(ii) $128 \in \{y: \text{the sum of all the positive factors of y is } 2y\}$.

(iii) $3 \notin \{x: x^4-5x^3+2x^2-112x + 6 = 0, x \in R\}$.

(iv) $496 \notin \{y : \text{the sum of all positive factors of y is } 2y\}$.

ANSWERS SHEET - 1

LEVEL-1

1. C
2. D
3. C
4. B
5. C
6. B
7. C
8. B
9. A
10. B

LEVEL-2

1. C
2. B
3. B
4. C
5. B
6. A
7. $\{-\sqrt{3}, -\sqrt{2}, \sqrt{2}, \sqrt{3}\}$
8. $\{1, 2, 2^2, 2^3 \ldots 2^{p-1}, (2^p-1), (2^p-1)(2), (2^p-1)(2^2), \ldots, (2^p-1)(2^{p-1})\}$
9. (i) True (ii) False (iii) True (iv) False